REMARKS

Applicants' attorney would like to thank the Examiner for his comments. Independent Claims 1 and 24 have been amended to require a non-contact printing process. Claim 1 has been further amended to require absorbent hydrophilic fibers. Dependent Claims 9, 10 and 13 support these amendments, and have been canceled.

Claims 1, 15 and 24 have been amended to recite the formation of a superabsorbent polymer consisting essentially of particles which stick to fiber surfaces and are spaced apart by an average distance of about 50-4000 microns. This amendment is supported by the paragraph traversing pp.22-23 of the specification.

The claims of the invention integrate two different concepts and simultaneously address two different problems. The concepts are a) the precise deposition of superabsorbent polymer precursor composition within a nonwoven web of absorbent (e.g. cellulose) fibers by printing, and b) the use of a non-contact process which avoids mechanical contact between the printing apparatus and the absorbent fibers.

The first concept addresses the problem of gel blocking. It is known in the art to combine superabsorbent particles with a nonwoven fibrous web using techniques which randomly disperse the superabsorbent particles among the fibers, so that many of the superabsorbent particles touch each other or are very close to each other. When the nonwoven web becomes wet, the superabsorbent particles swell and join together with adjacent particles to cause gel blocking. Gel blocking is a phenomenon by which adjacent swollen superabsorbent particles create an essentially solid layer of superabsorbent, through which a liquid insult cannot easily pass. Gel blocking over the entire area of a liquid insult may essentially defeat the purpose of an absorbent article by preventing liquid

from reaching much of the absorbent and superabsorbent material located beneath the blocking gel. Gel blocking over part of the area of the liquid insult reduces the efficiency and effective capacity of an absorbent article by making it more difficult for liquid to reach some of the absorbent and superabsorbent material. The present invention overcomes or substantially reduces gel blocking by a) forming superabsorbent particles in situ, so that they stick to the fiber surfaces, and b) spacing the superabsorbent particles apart in a controlled manner using a printing process which provides enough space between adjacent superabsorbent particles to prevent them from forming blocking gels when swollen.

The second concept addresses the desirability of maintaining absorbent nonwoven fibers in a loose, lofty configuration to maximize liquid movement and absorption within the fibrous web. Mechanical apparatus which contact and compress the absorbent fibers reduce the open spaces between the fibers, and therefore reduce liquid movement and absorption. The present invention preserves the loftiness and spacing between the fibers using a non-contact printing process. In other words, the process has the features of being a) precise, as with any printing process, while b) avoiding direct contact between printing equipment and the absorbent fibrous web. Suitable non-contact printing processes are disclosed on page 12, last four lines, in the specification.

a) Claim Rejection Based on 35 U.S.C. §102(b)/§103(a)

The Examiner rejected Claims 24-27 under 35 U.S.C. §102(b) as anticipated by or, alternatively, under 35 U.S.C. §103(a) as obvious over Itoh et al. (U.S. Patent 4,892,754). This rejection is respectfully traversed.

Independent Claim 24 requires providing a pre-formed fibrous web including cellulose fibers, adding a first superabsorbent polymer precursor composition to the web using a non-contact printing process, separately adding a second superabsorbent polymer precursor composition using a non-contact printing process, and chemically reacting the first and second precursor compositions on or in the web to form a superabsorbent polymer consisting essentially of particles which stick to the fiber surfaces and are spaced apart by an average distance of 50-4000 microns.

Itoh et al. does not disclose or suggest separately applying first and second superabsorbent polymer precursor compositions using a non-contact printing process. Itoh et al. does not disclose forming superabsorbent particles on or in a nonwoven web of absorbent fibers, wherein the superabsorbent particles have a controlled spacing of 50-4000 microns. Itoh et al. discloses no effort to control the spacing between adjacent superabsorbent particles.

The Examiner cites passages of Itoh et al. stating that a radical polymerization initiator is applied uniformly to a fibrous substrate by spraying or the like, and a radical polymerization initiator is applied uniformly in the form of a separate solution by spraying, coating or the like. (Col. 6, lines 49-59). A conventional spraying process may achieve uniform coating on a macroscopic scale, by applying a roughly equal amount of solution in grams per square meter across a surface area. However, a conventional spraying process is not precisely controlled to achieve uniform spacing of particles on a microscopic scale, as would be required to prevent or substantially reduce gel blocking between adjacent superabsorbent particles. A conventional spraying apparatus results in random spacing of droplets. When applied in a random fashion, with no control over

spacing, many of the droplets will touch each other or be immediately adjacent to each other, resulting in formation of superabsorbent particle agglomerates. The claimed non-contact printing process has the ability to provide controlled spacing between adjacent superabsorbent particles (resulting in uniformity on a microscopic scale), as well as providing a uniform amount of superabsorbent across the macroscopic area of the fibrous web.

The Examiner states that there are only three conventional methods (impregnating, spraying and coating) for applying the compositions suggested by Itoh et al. None of these conventional methods encompasses or suggests the claimed non-contact printing process or the resulting controlled spacing of superabsorbent particles. An impregnating process generally involves dipping (e.g., soaking) a fibrous web in a solution to saturate the web. A typical spraying process involves random application of droplets to provide a coating which can be uniform over a macroscopic area, but without controlled spacing between individual droplets. Many of the droplets applied by spraying will touch each other. "Coating" processes encompass a variety of processes which provide uniform coverage over a macroscopic area. The "mist" process cited by the Examiner is one form of spraying/coating process which relies on condensation and/or gravity to provide a uniform coating over a macroscopic area, but without controlled spacing between adjacent droplets.

None of the foregoing prior art processes provides controlled spacing between individual droplets resulting in a superabsorbent consisting essentially of spaced apart particles having the spacing recited in Claim 24. None of the prior art processes

suggests a non-contact printing process as recited in Claim 24. Claims 25-27 depend from Claim 24, and are patentable for at least the same reasons.

b) Examiner Comments Regarding Claims 1-3, 7-9 And 11-14

The Examiner provided comments regarding Claims 1-3, 7-9 and 11-14, without formally rejecting these claims (Office Action, p. 4). Applicants will respond to these comments in order to facilitate prosecution of this case. If the Examiner deems it necessary to reject Claims 1-3, 7-9 and 11-14 in a subsequent (second) Office Action, Applicants request that the second Office Action be non-final because these claims have not yet been formally rejected.

Independent Claim 1 requires adding a superabsorbent polymer precursor composition to a fibrous web using a non-contact printing process and chemically reacting the precursor composition on or in the fibrous web to form a superabsorbent polymer consisting essentially of particles which stick to fiber surfaces and are spaced apart by an average distance of 50-4000 microns. The fibrous web includes absorbent fibers.

For the reasons explained with respect to Claim 24, Itoh et al. does not disclose a non-contact printing process for applying a superabsorbent polymer precursor composition, and does not disclose a superabsorbent polymer consisting essentially of spaced apart superabsorbent particles having controlled spacing of 50-4000 microns between adjacent particles. Itoh et al. also does not suggest the claimed process. While the broad disclosure encompasses the use of absorbent fibrous webs, for instance, the Examples of Itoh et al. use only polyester fibrous webs, whose fibers are not absorbent. In each example, a polyester fibrous web is coated and impregnated with a monomer solution. There is no effort to apply the monomer solution as droplets having controlled spacing

between them. As a result, the resulting superabsorbent polymer either a) will not be in the form of discrete particles, or b) if discrete particles are present, many of them will be in contact with each other and/or present as particle agglomerates. Unlike the claimed process, the processes of Itoh et al. will not substantially avoid gel blocking by providing controlled spacing between superabsorbent particles.

In each of Examples 1-17 of Itoh et al., the amount of monomer applied ranged from 5 to 12 times the weight of the nonwoven fabric being coated. Regardless of whether the monomer is applied by spraying, immersion or otherwise, such high levels of monomer coating will not result in a product having controlled spacing between superabsorbent particles. Instead, the substantial saturation of a nonwoven web as taught by Itoh et al. will result in a high level of superabsorbent gel with no means of avoiding gel blocking.

Claims 2-3, 7-8, 11, 12 and 14 depend from Claim 1, and are patentable for at least the same reasons. Claims 9 and 13 have been canceled.

c) Claim Rejections Based On 35 U.S.C. §103(a)

The Examiner rejected Claims 4-6 under 35 U.S.C. §103(a) as obvious over Itoh et al. (U.S. Patent 4,892,754). Claims 4-6 depend from Claim 1, and are patentable for at least the same reasons. Furthermore, it would not have been a matter of routine experimentation to determine optimum viscosity ranges for a non-contact printing process where, as here, the Examiner acknowledges that there are only three conventional application techniques for superabsorbent precursor compositions as disclosed in Itoh et al., and Applicants' non-contact printing process is not encompassed by any of the three

techniques. Where the claimed process is not obvious, it could not have been obvious to optimize the process.

The Examiner rejected Claims 9 and 15-23 under 35 U.S.C. §103(a) as obvious over Itoh et al. in view of Trokhan et al. (U.S. Patent 5,547,747) and either Anderson (U.S. Patent 6,103,061) or Wisneski et al. (U.S. Patent 6,533,989).

The rejection based on Itoh et al./Trokhan et al./Wisneski et al. is not valid because Wisneski et al. is not statutory prior art. See 35 U.S.C. §103(c). The patent to Wisneski et al. and the instant application are both assigned to Kimberly-Clark Worldwide, Inc. Wisneski et al. issued after 14 December 2001, the filing date of the instant application, and is not available as a reference under any statute.

The rejection based on Itoh et al./Trokhan et al./Anderson is respectfully traversed. Claim 9 has been canceled. Regarding independent Claim 15, Itoh et al. does not disclose use of a non-contact printing process, and does not disclose a superabsorbent polymer consisting essentially of particles which stick to fiber surfaces and are spaced apart by an average distance of 50-4000 microns. In this regard, the above discussions of Itoh et al. are applicable to Claim 15.

Trokhan et al. discloses using a <u>contact</u> process to form regions of different topography on an absorbent structure and apply a liquid precursor to the rolls. The absorbent structure is squeezed, pressed, and deformed between opposing rollers (See Figs.1-3). The process of Trokhan et al. is <u>inoperable</u> to Applicants' invention which requires a <u>non-contact</u> process to maintain the loft and spacing between the absorbent fibers. Applicants' Claim 15, and the process of Trokhan et al., are <u>mutually exclusive</u>. Trokhan et al. <u>teaches away</u> from the claimed invention.

Anderson et al. is directed to a creping process , and has nothing to do with Applicants' invention. As illustrated in Fig. 2, a creping adhesive is applied to one or both sides of a nonwoven web, whereupon the nonwoven web is compressed between nip rolls, wrapped around a large roll, and creped using a doctor blade 62 and/or 84. The purpose and effect of the creping process is to deform the nonwoven web, and the creping adhesive renders the deformations permanent. Applicants' claims, by contrast, use a non-contact printing process in order to avoid compressing and deforming the absorbent nonwoven web. The process disclosed in Anderson et al. is therefore inoperable as to Applicants' claimed invention, and a person skilled in the art would not consider Anderson et al. to be a source of relevant prior art. Anderson et al. says nothing about forming a superabsorbent polymer in situ from a precursor composition.

The rejection of Claims 15-23 is based completely on hindsight, and should be withdrawn for this additional reason. The Examiner has shown no motivation for a person skilled in the art to combine these divergent references to arrive at Applicants' claims. A person skilled in the art, faced with the dual challenges of a) forming superabsorbent particles in an absorbent web with controlled spacing between them, while b) avoiding contact with the absorbent web, to preserve its loftiness, will not consult prior art which achieves opposite or unrelated purposes. Such a person skilled in the art has no motivation to consult Trokhan et al. or Anderson et al. Both of these references are directed to intentional deformation of a nonwoven web, which is the opposite of what Applicants are trying to accomplish. The Examiner is asked to place himself in the shoes of a person skilled in the art faced with Applicants' challenges. Such a person would not consult references which defeat his or her own objectives.

d) Claim 10 Has Not Been Addressed

The Examiner has not rejected Claim 10, has applied no prior art, and has not otherwise commented on Claim 10. The limitations of Claim 10 have been added to independent Claims 1 and 24. For the reasons presented above, Applicants believe that all of the claims are patentable. However, if the Examiner has any reason for rejecting a claim not previously rejected, then the next Office Action should be in a non-final form.

f) Conclusion

Applicants believe that the claims are in condition for allowance. If the Examiner feels that any issues remain unresolved, then Applicants' attorney respectfully requests a telephone call from the Examiner, and a telephone interview.

Respectfully submitted,

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